Microsemi LAWRENCE

TECHNICAL DATA

PNP SWITCHING SILICON TRANSISTOR

Qualified per MIL-PRF-19500/ 290

Devices		*Qualified Level*
2N2904	**2N2905**	**JAN**
2N2904A	**2N2905A**	**JANTX**
2N2904AL	**2N2905AL**	**JANTXV**
		JANS

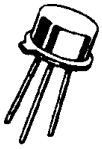
MAXIMUM RATINGS

Ratings	Symbol	2N2904 2N2905	2N2904A, L 2N2905A, L	Unit
Collector-Emitter Voltage	V_{CEO}	40	60	Vdc
Collector-Base Voltage	V_{CBO}	60		Vdc
Emitter-Base Voltage	V_{EBO}	5.0		Vdc
Collector Current	I_C	600		mAdc
Total Power Dissipation @ $T_A = +25^0C$ (1) @ $T_C = +25^0C$ (2)	P_T	0.6 3.0		W W
Operating & Storage Junction Temp. Range	T_J, T_{stg}	-65 to +200		^0C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.29	$^0C/mW$

1) Derate linearly 3.43 W/^{0}C for $T_A > +25^0C$
2) Derate linearly 17.2 W/^{0}C for $T_C > +25^0C$



TO-39* (TO-205AD)
2N2904, 2N2904A
2N2905, 2N2905A



TO-5*
2N2904AL, 2N2905AL

*See appendix A for package outline

ELECTRICAL CHARACTERISTICS ($T_A = +25^0C$ unless otherwise noted)

Characteristics		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage I_C = 10 mAdc	2N2904, 2N2905 2N2904A, L, 2N2905A, L	$V_{(BR)CEO}$	40 60		Vdc
Collector-Emitter Cutoff Voltage V_{CE} = 40 Vdc V_{CE} = 60 Vdc	 2N2904, 2N2905 2N2904A, L, 2N2905A, L	I_{CES}		 1.0 1.0	 µAdc
Collector-Base Cutoff Current V_{CB} = 50 Vdc V_{CB} = 60 Vdc	 2N2904, 2N2905 2N2904A, L, 2N2905A, L All Types	I_{CBO}		 20 10 10	 ηAdc µAdc
Emitter-Base Cutoff Current V_{EB} = 3.5 Vdc V_{EB} = 5.0 Vdc		I_{EBO}		 50 10	 ηAdc µAdc

ELECTRICAL CHARACTERISTICS (con't)

Characteristics		Symbol	Min.	Max.	Unit
ON CHARACTERISTICS [3]					
Forward-Current Transfer Ratio					
I_C = 0.1 mAdc, V_{CE} = 10 Vdc	2N2904	h_{FE}	20		
	2N2905		35		
	2N2904A, 2N2904AL		40		
	2N2905A, 2N2905AL		75		
I_C = 1.0 mAdc, V_{CE} = 10 Vdc	2N2904		25	175	
	2N2905		50	450	
	2N2904A, 2N2904AL		40	175	
	2N2905A, 2N2905AL		100	450	
I_C = 10 mAdc, V_{CE} = 10 Vdc	2N2904		35		
	2N2905		75		
	2N2904A, 2N2904AL		40		
	2N2905A, 2N2905AL		100		
I_C = 150 mAdc, V_{CE} = 10 Vdc	2N2904, 2N2904A, L		40	120	
	2N2905, 2N2905A, L		100	300	
I_C = 500 mAdc, V_{CE} = 10 Vdc	2N2904		20		
	2N2905		30		
	2N2904A, 2N2904AL		40		
	2N2905A, 2N2905AL		50		
Collector-Emitter Saturation Voltage					
I_C = 150 mAdc, I_B = 15 mAdc		$V_{CE(sat)}$		0.4	Vdc
I_C = 500 mAdc, I_B = 50 mAdc				1.6	
Base-Emitter Voltage					
I_C = 150 mAdc, I_B = 15 mAdc		$V_{BE(sat)}$		1.3	Vdc
I_C = 500 mAdc, I_B = 50 mAdc				2.6	
DYNAMIC CHARACTERISTICS					
Small-Signal Cutoff Frequency					
I_C = 1.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz					
	2N2904	h_{fe}	25		
	2N2905		50		
	2N2904A, 2N2905A		40		
	2N2904AL, 2N2905AL		100		
Small-Signal Cutoff Frequency, Magnitude					
I_C = 50 mAdc, V_{CE} = 20 Vdc, f = 100 MHz		$\lvert h_{fe} \rvert$	2.0		
Output Capacitance					
V_{CB} = 10 Vdc, I_E = 0, 100 kHz ≤ f ≤ 1.0 MHz		C_{obo}		8.0	pF
Input Capacitance					
V_{EB} = 2.0 Vdc, I_C = 0, 100 kHz ≤ f ≤ 1.0 MHz		C_{ibo}		30	pF
SWITCHING CHARACTERISTICS					
Turn-On Time					
V_{CC} = 30 Vdc; I_C = 150 mAdc; I_{B1}= 15 mAdc		t_{on}		45	ηs
Turn-Off Time					
V_{CC} = 30 Vdc; I_C = 150 mAdc; I_{B1} = I_{B2} = 15 mAdc		t_{off}		300	ηs

(3) Pulse Test: Pulse Width = 300μs, Duty Cycle ≤ 2.0%.